Atmosphere Model Working Group (AMWG) Overview

Rich Neale
NCAR
<table>
<thead>
<tr>
<th></th>
<th>THIS AFTERNOON</th>
<th>TONIGHT</th>
<th>MONDAY</th>
<th>MONDAY NIGHT</th>
<th>TUESDAY</th>
<th>TUESDAY NIGHT</th>
<th>WEDNESDAY</th>
<th>WEDNESDAY NIGHT</th>
<th>THURSDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chance Snow</td>
<td>50%</td>
<td>Chance Snow</td>
<td>40%</td>
<td>Partly Cloudy</td>
<td>Mostly Sunny</td>
<td>Mostly Cloudy</td>
<td>Partly Sunny</td>
<td>Mostly Cloudy</td>
<td>Breezy</td>
</tr>
</tbody>
</table>
AMWG co-chairs

Rich Neale (NCAR) rneale@ucar.edu
Mark Taylor (DOE/Sandia) mataylo@sandia.gov
Minghua Zhang (Stony Brook) mzhang@notes.cc.sunysb.edu

Local Arrangements

Joint AMWG/ChemClim session (Tuesday AM)
Joint AMWG/WACCM session (Wednesday PM)
CESM Tutorial/web-release forms

Lunch in the cafeteria (follow locals)
Reception this evening (no alcohol)
CESM Planning

CESM2 Timelines:

- **Early 2015**: CAM5+ model version finalized, subject to tuning modifications, for use in the WACCM, BGC/chemistry, and CISM configurations.
- **July 2015**: Component models for CESM2 are nearly final, subject to modification (tuning) based on coupled model performance.
- **July-Dec, 2015**: Perform coupled simulations with finalized components for supported configurations; Tuning/modification of component models as needed to maximize coupled simulation quality.
- **Jan 2016**: CESM2 supported configurations are finalized, including final parameter settings, etc. for different component models.
- **Jan-June 2016**: PI control runs and 20th century runs performed for supported CESM2 configurations.
- **June 2016**: CESM2 Model release; To include PI control run, 20th century run, AMIP runs for supported configurations (at a minimum).
- **Post-June 2016**: CESM2 scenario runs (and others) performed.

CESM2 Targets:

- “Bleeding edge” physical climate model version (with CAM6)
- Physical climate model with WACCM
- Carbon cycle/BGC model version with enhanced atmospheric chemistry coupling
- Coupled ice sheet integrations
CAM Development Timelines

The path towards CMIP6

- 2013 (CESM1.2)
  - CAM5 0.25 deg tuning
  - Vertical resolution testing (L60)?
  - With CAM5 physics
- 2014 (CESM1.3)
  - Prescribed MAM implementation
  - Consistent sub-grid orography
  - Prescribed MAM testing
- 2015 (CESM1.4)
  - MG2 implementation
  - Test TMS and replace scheme with EC scheme
  - Efficiency improvements for 2deg CAM5
- 2016 (CESM2)
  - Replace GWD with WACCM scheme
  - Testing alternative cloud physics (UNICON, CLUBB)
  - RRTM radiation update
  - MAM7 implementation
  - Physics decisions for CAM6
  - Control simulations with CAM6 physics

CAM6 model in CESM2 for CMIP6

CAM6 low resolution model

Physics decisions for low-res CAM6

Physics decisions for CAM6

Efficiency improvements for 2deg CAM5

With new physics options

Vertical resolution testing for CAM5 physics

Decision for vertical resolution increase

CAM5 0.25 deg tuning

RRTM radiation update
CAM6 Development Webpage

Documenting development simulations and activities

- New diagnostics package (updates coming soon)
  - Timeseries history output
  - Chemistry and WACCM specific plots
  - Updated variability package

http://www.cesm.ucar.edu/working_groups/Atmosphere/development/cam6/
Available from AMWG homepage (recently updated, finally!)
Further CAM developments

Ongoing model developments and diagnoses (+ many more!)

- Fix microphysics/activation liquid cloud fraction inconsistency + droplet mass/# inconsistencies – LLNL
- Implementing PDF-based macro/micro schemes – LLNL/NCAR
- Further development of 7-mode MAM (MAM7) – PNNL
- Unified scheme for aerosol vertical transport, activation, and removal in convective clouds – PNNL/LLNL
- Advanced microphysics in convection - UCSD/NCAR
- Applying new ice nucleation in mixed phase clouds – PNNL/LLNL/DRI
- Dust wet deposition and wet scavenging updates - Cornell
- Deriving vertical velocity variance from TKE - NCAR
- Implementing sub-columns for physics – NCAR/SBU
- Atmospheric nudging to diagnose biases - NCAR/LLNL/SBU
- CAPT experiments to diagnose biases - NCAR/LLNL
- Model for prediction across scales (MPAS) – NH core - NCAR/LANL
- Adaptive mesh refinement – LBNL
- CAM-SE regional mesh refinement – Sandia
- CSLAM tracer transport in flux form - NCAR/Sandia
- Blocked flows and turbulent mountain stress – NCAR
- Conserved energy changes required in physics - NCAR